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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/663,809	09/17/2003	Masanobu Nishitani	116927	4046
25944 7590 02/04/2008 OLIFF & BERRIDGE, PLC P.O. BOX 320850 ALEXANDRIA, VA 22320-4850			EXAMINER SAINT CYR, LEONARD	
			ART UNIT 2626	PAPER NUMBER
			MAIL DATE 02/04/2008	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/663,809	Applicant(s) NISHITANI ET AL.	
	Examiner Leonard Saint-Cyr	Art Unit 2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 3, 4, 6-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3, 4, 6-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 01/08/08 has been entered.

Response to Arguments

2. Applicant's arguments filed 01/08/08 have been fully considered but they are not persuasive.

Applicant argues that Shinoda et al., do not teach obtaining a set of respective training speech x_N by matching in time series a plurality of the training speech data with respective states of an HMM having any one of the Gaussian distribution numbers from the predetermined value to the maximum distribution number; and computing a description length for each of the plurality of states having the plural types of Gaussian distribution numbers using a minimum description criterion applied to the data x_N (Amendment, Page 1).

The examiner disagrees, Shinoda et al., teach that when a set of models $(1, \dots, i, \dots, I)$ and data $X_N = (x_1, \dots, x_N)$ are given, a description length $l(i | x_N)$ applying

model i is defined by:

$$l_i(x^N) = -\log P^{(i)}(x^N) + \frac{1}{2} \log N + \log I$$
, where $\theta(i)$ represents the maximum likelihood estimate of the parameter. A method to reduce the number of distributions in each state effectively in Gaussian mixture distribution HMM is proposed, wherein a model having large number of distributions trained with sufficient training data amount is prepared at first, and a Gaussian distribution tree for each state is built. Then a set which makes minimum description length (MDL) criterion minimum is selected for each state (pages 19 – 23; page 2, section 3, lines 1 – 7). Using a set of models $(1, \dots, i, \dots, I)$ and data $X^N = (x_1, \dots, x_N)$ for calculating a description length, wherein a model having large number of distributions trained with sufficient training data amount is prepared implies obtaining a set of respective training speech x^N by matching in time series a plurality of the training speech data with respective states of an HMM having any one of the Gaussian distribution numbers from the predetermined value to the maximum distribution number, and computing a description length, since a set which makes minimum description length (MDL) criterion minimum is selected for each state.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 1, 3, 4, 6- 9 are rejected under 35 U.S.C. 102(a) as being anticipated by Shinoda et al., (HMM Size Reduction using MDL Criterion, Japan, March 2002).

As per claim 1, Shinoda et al., teach an acoustic model creating method of creating an HMM (Hidden Markov Model) by optimizing, for each state, Gaussian distribution numbers of the respective states constituting the HMM and retraining the optimized HMM using training speech data, the method comprising:

setting plural types of the Gaussian distribution numbers from a predetermined value to a maximum distribution number for each of the plurality of states constituting the HMM ("model having a large number of distributions trained with sufficient training data"; page 1; introduction, lines 19 – 23);

obtaining a set of respective training speech x_N by matching in time series a plurality of the training speech data with respective states of an HMM having any one of the Gaussian distribution numbers from the predetermined value to the maximum distribution number ("large number of distributions"; page 2, section 3, lines 1, and 2; page 1, lines 19 - 23);

computing a description length for each of the plurality of states having the plural types of Gaussian distribution numbers using a Minimum Description Length criterion applied to the data x_N ("Minimum Description Length criterion minimum is selected for each state"; page 1; introduction, lines 23, and 24);

selecting a state having the Gaussian distribution number whose description length is minimum, for every state (page 4, line 4);

constructing the HMM in accordance with the state having the Gaussian distribution number whose description length is minimum, selected for every state ("re-estimate all HMM parameters"), and retraining the constructed HMM using the training speech data ("re-training HMM"; page 4, lines 5 – 7; page 5, lines 8 – 10); and

performing speech recognition using the retrained HMM (page 4, section 5, lines 1, and 2)

As per claims 3, and 4, Shinoda et al., further disclose that the second term on the right side of the equation being multiplied by a weighting coefficient α , and the third term on the right side being omitted ("the second term is multiplied by penalty coefficient α "; page 3, lines 10, and 11).

As per claim 6, Shinoda et al., further disclose that the Gaussian distribution numbers being the maximum distribution number ("large number of distributions"; page 1, lines 19 – 23).

As per claim 7, Shinoda et al., further disclose that the HMMs being syllable HMMs ("phonological"; page 5, lines 3 – 7).

As per claim 8, Shinoda et al., further disclose that the syllable HMMs having the same consonant out of the states constituting the syllable HMMs tie an initial state or at least two states including an initial state in the syllable HMMs, and the syllable HMMs

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having the same vowel tie a final state of the states having self loops or at least two states including the final state in the syllable HMMs ("initial model"; page 4, section 4, line 5 – page 4, line 7)

As per claim 9, Shinoda et al., further disclose that a speech recognition device recognizes input speech using HMMs (Hidden Markov Models) as acoustic models for feature data obtained by feature analysis of the input speech, the HMMs created by the acoustic model creating method according to claim 1 being used as the HMMs which are the acoustic models ("used acoustic feature"; page 4, section 5, lines 1 - 6).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonard Saint-Cyr whose telephone number is (571) 272-4247. The examiner can normally be reached on Mon- Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (571) 272-7602. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LS
10/22/07


RICHEMOND DORVIL
SUPERVISORY PATENT EXAMINER